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The Adirondacks of New York ; Madoc, Ontario ; Northern Michigan: [specimens] 18328-18435. No. 98 1890

Van Hise, Charles Richard, 1857-1918
[s.l.]: [s.n.], 1890

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U. S. GEOLOGICAL SURVEY

FIELD SECTION BOOK

No. 98.

The Adirondacks of New York;
Madoc, Ontario;
Northern Michigan.
C. R. Vanhise, 1890

18328 – 18435

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

1. Ordinarily at least two pages of this book will be devoted to one section. On the left-hand page, place a map of as much of the section as has *actually been seen.* Denote rivers, lakes, marshes, etc., by the usual topographical signs. Denote the ledges of rock, when no structure is made out, by cross-hatching, making the cross-hatching cover as nearly as possible the areas occupied by the exposures. If the rock is a massive one, but still more or less plainly bedded, use the same sign with a dip arrow and number attached, showing the direction and amount of the dip. Denote a shaly or other very plainly bedded ledge by right parallel lines, and a ledge having a secondary structure by wavy parallel lines running in the direction of the strike, with dip arrow and number attached as before. The greatest care must be taken to avoid confusing slaty or schistose structure with bedding, and in all cases where there is the least doubt about the true bedding direction, indicate it by a query. To each exposure on the face of the map attach the number of the specimen representing it. In mapping the section count each of the spaces between the blue lines as 100 paces, and twenty of these spaces to one mile, or 2,000 paces. Usually the southeast corner will be placed at the bottom of the page, or at the first black line above the bottom of the page, and at the right-hand side. If, however, for any reason, it is desirable to show portions of an adjoining section, the southeast corner may be shifted up, or the map may be turned around and the north placed at the left-hand side of the page. The ruling of the left-hand page is also arranged so that, if desirable, a smaller scale can be used, two inches, one inch, or even one-half inch to the mile. With the two-inch scale, the squares outlined in black represent sections, and those in red, quarter sections and "forties," while the space between the blue lines is 200 paces.

2. On the right-hand page place the notes descriptive of the exposures. Begin in each case with the number of the specimen, placing the number on the left-hand side of the red line, after which give in order on the right of the same red line the position of the ledges as reckoned in paces from the southeast corner of the section, and the dip and strike when observable, for instance 4025, 250 *N.*, 300 *W.*, *Strike*, *N.* 6° *E.*, *Dip*, 50° *E.* Then follow with as full a description of the ledge as possible. When topographical maps are used for locations this paragraph applies only in part.

3. Collect a specimen from every ledge, or wherever there is a change of rock on any one ledge, taking care to get fresh material, unless for a special purpose the weathered surface is desired. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be specimened, but chips of them must be taken. The position and extent of the ledges not specimened should be marked on the map, with notes that each is of a rock identical with specimen so-and-so. Under the same conditions small sized specimens, trimmed to a uniform size of 2 x 2½ x ¾ inches will be allowed, but in all other cases *large sized specimens*, trimmed to a size of 3 x 4 x 1 inches, must be selected, in accordance with section 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. In all cases collect chips for slicing. Specimens should not be placed together without protection in the collecting bag as the fresh surfaces, important in determining the character of rocks, are thus destroyed. They should be damaged by no temporary mark, but the numbers should be at once marked in at least two places upon the inclosing paper or cloth bags. It is desirable that specimens be permanently marked in camp by painting the numbers upon them in white upon a black background, using Silver White and Ivory Black oil tubes for color, with turpentine as a diluent.

4. On the last twenty-five pages of the book give, as may seem desirable, a general account of the examination of the region mapped in the previous pages, correlation of observations, sketches, cross sections, etc.

5. Forward this note book as soon as filled as registered mail matter to C. R. Van Hise, U. S. Geologist, Madison, Wis.

#98

Bonaparte Lake, New York,
Sunday, August 10, 1890.

The forenoon was spent in
making a trip about Lake
Bonaparte in a steam launch.
In going out the last shore
of the lake was followed. In
returning we followed the
west shore. The limestone
was first found, and con-
tinued for some distance;
then at intervals was found
a granitic or gneissic rock.
Specimens of the above were
taken. At the north end
of the lake the limestone and
white granitic rock were
found on the same island.
The contact between the two
was covered, but the lime-
stone and feldspar rock oc-
cupy the same level.
Going along the west side
of the lake, the granite like
rock and evenly laminated
rock and the limestone were

all seen. The laminated rock was not visited. It is possible that this is the great gneiss which belongs with the limestone?

Upon leaving the hotel the limestone rises into a cliff 50 feet or more high. Here it seems to contain fragments or blocks of rock the layers of which are like the white feldspathic rock. The appearance is here very much like that at the east side of the Adirondacks, that is, the limestone has a conglomeratic aspect which is quite probably only pseudo.

18328 Granite near contact with limestone at north end of lake Bonaparte.

18329 Granite near limestone at contact near hotel.

A little farther on the limestone and white feldspathic rock are found in contact at a spring about one half mile from the hotel. The contact is exceedingly irregular and there is a contact zone about two feet wide between the two rocks. The feldspathic rock (18329) is very like some of the phases of hypersthene gabbro of the eastern side of the mountains. The whole appearance of the contact for such is seen to extend up the cliff for 50 feet in an irregular line suggests that the feldspar rock is a later eruptive and has altered the limestone along the contact. If this is the case it corresponds with the suggested eruptive origin of the contacts and pseudo conglomerates of the Cheever mine and Fort Ann.

18330 in a nodule from one of the fragment-like areas in the limestone.

The afternoon was spent in a drive down the railroad to Natural Bridge.

On the way Eugene Clark's farm (Diana Township, Lewis county, New York.) was visited where is found a
18332 } large mass of wollastonite,
18333 }
18334 }

During the outward drive to Natural Bridge we stopped at a railway crossing where was a rock cut about one mile before reaching Natural Bridge. Here was seen in a single exposure apparently grading into each other, many phases of rock which run
18335 }
18336 }
18337 } from a fine pure coarse feldspar
18338 } rock to a fine-grained gabbro-like
18339 } rock. This gradation is represented by 18335, 18336, 18337, 18338, 18339.

There can be little doubt that this rock is like the hypersthene gabbro of the eastern Adirondacks. This occurrence suggests what was suspected before, that the affinities of the feldspathic rocks of Bonaparte Lake are with the hypersthene gabbro.

The whole of the above rocks are very much like the white rocks, nearly pure feldspar which occur at the Root quarry (1832).

This is spoken of as being a pegmatite vein or dyke. It turns out upon microscopic examination to be like the white feldspar rocks here, it tends to confirm the notion of the intrusive character of the feldspathic rocks. As far west as Root's the gneiss is the chief rock and occurs interstratified with the limestone. The gneiss is a mere accessory. At Bonaparte Lake the white

feldspathic rock is the predominant phase aside from the limestone. This suggests, with what was seen on the eastern side of the Adirondacks, that the core of the mountain is of the hypersthene gabbro. The relations with the limestone on the west suggests that it is eruptive. As indicated in the notes of yesterday, the contacts south of the Sterling is spoken of as a possibly eruptive one. The relations of the limestones and hypersthene rocks at the Cheever ore bed may be explained on the basis of an eruptive contact as before suggested.

Upon reaching the Natural Bridge the water was found to pass under the limestone, forming a considerable cave at the entrance and emerging some distance below.

At one side of the stream, just above the cave, the limestone and white feldspathic rock are again found in contact.

18340
18341 } Limestone

18342 White feldspathic rock at Natural Bridge.

Upon Henry Hurlbut's farm, about one mile from Natural Bridge, the feldspathic rock and limestone are again found in contact, 18343, and here along the contact zone is a great development of large foliated black mica, phlogopite. The contact line appears to be vertical at Natural Bridge, but this point could not be positively determined. This mica and other minerals may be a zone two or more feet across. Along the contact at Natural Bridge

and at Hulbut's farm the limestone is very evenly crystalline, being a mass of coarse crystals of calcite.

The occurrences at the lake, at Natural Bridge, and at Hulbut's farm all point in the same direction, towards the later intrusive character of the feldspathic rock. That this part is a part of the gabbro mass of the Adirondacks is hardly to be questioned.

Nason says that in passing from the gneissic area, which is intermingled with the limestone west of the Adirondacks towards the interior the white feldspathic rock becomes more and more abundant, while the limestone extends in N a great distance. At Antwerp there is very little of the white rock; at Bonaparte Lake there is very little of

the gneissic rock. Mason says that above Bonaparte Lake the rock, aside from the limestone, is almost wholly of the feldspathic kind.

Madoc, Ontario.
Tuesday, August 12, 1890.

From Madoc we drove to Seymour Mine along the old Hastings road; thence east to Hematite; thence south to Madoc.

18344
18345
18346 Three phases of peculiar green hornblendic rocks with peculiar pitted, weathering rapidly, changing texture, and in places with a conglomeratic appearance. On the old Hastings road about one and one half miles northwest of Madoc.

The above rocks have a remarkable resemblance to those of Kekekabic Lake. These varieties of rock, with more quartzitic phases, continue for some distance. After these appear the flat-lying sandstones and limestones

which are taken to be Silurian. The above rocks are associated with large blocks of a peculiar brecciated limestone,
18347, which appears to be in place, although this is not certain. After an interval of the rocks of the latter formation there
18348. appears, again, 18348, hornblende rock which, however, is here fine-grained.

A little farther north and upon the same hill is
18349, felsite, which is flanked
18350. with limestone, 18350, containing very numerous fragments of the felsite and is believed to be Silurian.

Southwest of the Seymour ore pit, as is described by Vernor, we found a breccia, which, however, did not contain a very great variety of pebbles. The south side of the
18351 exposure is solid felsite, 18351.

In passing with the felsite contains fragments of felsite very abundantly, and also less plentiful fragments of another sort. It appears plainly to be an acid flow which either became brecciated or had dropped into it a large number of bombs of material of the same characters. The former is the more probable.

18352
18353
18354
} Three phases of the felsite breccia. In the above specimens, the phases containing hornblende like rocks, although seen in place, was not specimened.

In these hand specimens the fragments are necessarily small, but in exposure they are of large size as described by Dawson. The exposure is cut by 18355, which appears to be a basic dyke. It is interesting on account of the numerous

magnetite crystals which it contains.

The Seymour ore-body was next visited. The ore is
18356. magnetite, 18356, containing crystals of hematite, and the
18358. gangue, 18358, is a magnetitic chlorite rock. The country rock is apparently the gabbro facies already described, at least that rock is exposed nearby.

The thought is suggested by 18355 that the ore is a secondary concentration along a basic dyke. The chlorite
18357 rock, 18357, in appearance is much like that of the Spun and Keechigamme mines associated with the ore.

From the Seymour ore drove north to the next section line to the east, and then along

this road to the Hematite mine at which point we turned south towards Madoc.

The large open pit at the Hematite mine was full of water and it was impossible to determine relations, but the rocks above the pit appeared to be the horizontal Silurian sandstone and limestone. The relations of the ore to those rocks could not be made out.

18358 As a very heavy siderite dolomite taken from the dump pile; whether pre-Silurian is unknown.

Driving to the South, towards Madoc, the first rock found
18359. is red granite, 18359, which occurs in large exposures for some distance. At this exposure, but not in place,
18360. was taken, 18360, granite or felsite, with apparent flow-

sitions between the two. The rock from which it was broken lay near the large ledge of granite rock and it seems probable that it belongs hereabouts, but this is not positive.

Driving farther south there
18361. appears a felsitic rock, 18361, which is essentially like 18349.
18362, 18363, 18364. After this came a considerable series of felsites, 18362, 18363, 18364, which in many respects have a remarkable resemblance to quartzites. These felsites have a well marked bedding, which makes the likeness to the clastics still more prominent. Also they are like the felsites of the Keweenaw series of Lake Superior.

Leaving the felsites, the pitted hornblende-like rocks like those found on the road going north are seen for some distance. As the Silurian did not here appear they were seen more

extensively. As this rock was specimened on the road out no specimens were here taken.

After the hornblendic rocks there
18365. appeared a bright slate, 18365, which may be the transition phase between the hornblende rock and the true slates.

18366. Calcareous slate, farther on towards the south; dipping at an high angle.

18367. Black slate, some distance farther on; also having an high dip.

Just before Madoc was reached we came to a high ridge on which a peculiar conglomerate is exposed on a great scale. Unlike ordinary conglomerates, the bowlders, — sometimes two feet in diameter — are packed closely together in places, and are often angular. This conglomerate in some respects is like the Keewenaw Lake conglomerate of Lake Superior,

but more nearly like the peculiar conglomerates shown one by Merriam near Champion. However, the boulders are much larger and in places are packed nearer together and have a wider variety than at Champion. The greater quantity of the pebbles are felsite. Some of them quite coarse. Next in abundance is soft schistose rocks like the slates found on the road to the north. While less abundant are fragments which are like the hornblende rocks occuring north of the slates. It certainly appears that all the pre-Cambrian rocks before described on the section going towards Madoc had yielded their portion to the conglomerates, with the possible exception of the coarse red granite. Is this latter a later intrusive?

1868 } Phases of the finer conglomer-
1869 } ate.

1887 Pebbles knocked out of the conglomerate.

From the foregoing it appears that upon the two roads south of Hastings the series are much the same. The differences are probably largely due to lack of exposures upon the west road and to the northeast - southwest strikes. Upon the west road just after leaving Madoc large blocks of slate were found, but were not certainly in place. The strike would carry the conglomerate of the east road below the point at which we started upon the west road, and therefore these slate blocks would be in just the position they ought to be if in place.

The series above described have upon the whole a very close resemblance to that at Kekekabic and Ogishki Lakes. As at those lakes, it is a series of volcanic tuffs grading into

True conglomerates of the most complex sort and these both by vertical transition into ordinary slates.

Wednesday August 13, 1890.
From Madoc to Bridgewater and return.

Going east from Madoc we first come to a gray limestone almost vertical. After passing this the exposures were ~~almost~~ inconspicuous for some distance, and there appeared
18371, crystalline limestone.
Various phases of limestone continued for some distance, after which was found for a long way a peculiar slaty conglomerate containing fragments of many kinds and weathering with a peculiar pitted appearance.

Photo. 1059. Conglomerate east of Madoc at a distance of 2 ft. from which the pebbles
18372 are taken.

Photo, 1060. Same conglomerate as 1059, at a distance of six feet, but at another place in the exposure.

18372 Darwins pebbles from the conglomerate.

After passing the conglomerate
18373. appears 18373, slate which
continues for some distance;
18374. and then was found, 18374,
a slaty quartzose or else a felsite.

At the Black River Ridge,
not far from the water, the
exposures are large, and
here the rock is mainly a
green hornblende rock,
18375, which, however, contains a
few conglomerate like areas
18376. of which 18376 represents
a pebble or boulder.
The material here has a peculiar weathering and is
taken to be a surface volcanic
flow of basic material.
Darwins mica-schists and
green schists with their
characteristic weathering con-
tinue until Bridgewater was
reached.

Here at a lime kiln was
18377 found 18377, marble, which
is cut by a dyke of hornblende
18378. schist, 18378, ten or twelve
feet wide. The dyke cuts
directly across the marble,
but the schistose structure
of the dyke and the bedding
of the marble are parallel.
At the contact of the dyke
and limestone pyroxene
(diopside) has developed.

18379 is a contact specimen.

Driving south, just after
leaving the village of Bridg-
water, a bed of granite gneiss,
18380, ten or twelve feet across and
extending for a long distance
north and south is found
interbedded with hornblende-
18381. gneiss, 18381.

The exposure suggests that
the granitic rock is a sub-
sequent intrusion. The

hornblende-gneiss strikes in a general north and south course and dips about vertical. This hornblende-gneiss also contains smaller granite veins,
18382, which further suggests the intrusive character of the red rock.

Continuing to go south, there appears side by side and striking and dipping in the same direction, a
18383, crystalline limestone, and
18384, hornblende gneiss. The strike was here taken and found to be N. 15° E., allowing 10° variation to the west. The limestone and gneiss are within six feet of each other for some distance.

Continuing south the limestone swings to the right (west) of the road, and then next the hornblende-

gneiss, and then appears along the road red granite and gneiss like the above. This was found along the road for probably about a mile; and then a turn was made on a by-road to the west.

18385 represents the red granite gneiss at its last exposure.

After passing an interval of about 200 feet we come to a marble quarry which in places is a dazzling
18386. white marble, 18386, & This marble contains in places black hornblende-schist layers or nodules.

Photo. 1061. Shows blocks of hornblende schist in marble.

18387 Shows the character of the black hornblendic materials and also

the impure phases of the lime-stone.

The question arises, Is this lime-stone gneiss series an older one than the clastic series already examined, or is the more crystalline character of the latter due to the intrusion of the red granite. The latter seems perhaps the more probable. In the crystalline hornblende gneisses were no obscure forms which may be taces of fragments. Also in the mica-schist, before reaching the village, quartz-veins were ~~noticed~~ and the rocks became more crystalline. In my hurried journey there appeared something of a transition between the less and more crystalline rocks.

Returning from the limestone quarry a specimen of the crys-
18388. talline gneiss, 18388, which contains pebble-like protuberances

was obtained. The latter — the small roundish nodules — look like pebbles merging into the gneiss, and indeed resemble the most of the rock very closely. They may, however, represent the last traces of the pebbles, just as weathering shows the presence of fossils, all evidence of which in the fresh rock has apparently disappeared.

Driving west on the road, just south two lots, from the one we drove to Bridgewater upon, we came upon a very much brecciated and peculiar weathering limestone, which is much less crystalline than the limestone of Bridgewater. It is believed to belong to the crystalline series.

18389

Turning north about one mile west of Bridgewater toward the main road, we find

micaceous conglomerate studded with pebbles of various kinds.

18390
18391
18392
18393

In this conglomerate, in one direction the pebbles appear to be but little distorted; in the other they are seen to be greatly elongated. In the direction of greatest elongation one could hardly discover that the rock is a conglomerate. In the second direction the pebbles are seen, but are distorted, while in the third direction they are distinctly rounded pebbles. In all respects this conglomerate is like that of the Black Hills and the conglomerates of Vermont, although the pebbles are here distorted to the degree that they are at Vermont, where they are drawn out into sheets almost like paper.

Photo, 1062, Conglomerate

with much distorted pebbles. On way from Bridgewater to Madoc. See specimens 18390–18393.

Continuing north before the main road is reached, we pass a succession of conglomerates which have a felsitic appearance, and then into the peculiar green weathering conglomerate noted on the road in the outward trip. Upon account of lack of time we were not able to closely examine the conglomerate but the mass of the felsite like zone in appearance was like 18374, which could not be determined to be felsitic or quartzitic.

Upon entering the village of Madoc the crystalline limestone, 18394, with almost vertical dip is found. The altered character of the conglomerates at Madoc and their much altered character at Bridgewater corresponds with the degree of the

crystallization of the limestones, both altered limestone being at Madoc and coarsely crystalline ones at Bridgewater.

The examination of the Hastings series leaves no doubt of the thoroughly clastic character of a part of it, and that this part also bears fragments of the not far distant eruptive rocks. There can be no question also that these rocks are of pre Cambrian age. It is then certain that we have here an Algonkian series. It is true that this series is one in which volcanic activity has played a large part; but this has nothing to do with the age of the rocks. As a whole the series in lithological character is not closely like the original Huronian.

Friday, August 15th, 1890.
Alexandria Bay, N. Y.

Trip from Alexandria Bay to Canadian shore and return.

18395 Granite, shortly after starting out; Hesklis Island.

18396 Biotite gneiss which is intercalated with and cut across by granite veins in the most irregular manner. The latter appears to be an injection. Foot of Ellis Island.

18397 Another phase of schist, much altered; farther north.

18398. Quartzose gneiss intimately
18399. associated and apparently cut across by 18399, the ordinary granite of the St. Lawrence. Head of Lawson's Island.

Photos. 1063, 1064. Views of the Thousand Islands.

Photo. 1065. View of Castle Rock, owned by George M. Pullman. Thousand Islands.

When riding last through the Thousand Islands on the steamboat nothing was seen but the red granite noted the day before.

Saturday Aug. 16, 1890.

Went by rail from Ogdensburgh, N.Y. to Racquette Pond in the Adirondacks; then by row boat to the head of Tupper Lake.

At the station we saw many bowlders and large angular blocks of hypersthene gabbro which is being used as a foundation stone for a saw mill and is said to come from a ledge near by.

18400. Hand specimen from one of these blocks.

In going up Racquette Pond, the first exposure found is,
18401, red granite. This continues for some distance, when the coarse hypersthene rock is found.
The hypersthene gabbro continues to near the head of Tupper Lake, where after

an interval, is found very
coarse, strongly quartz &
red granite.

Sunday August 17, 1890.

Went by boat from head of Tupper Lake to Portage, and thence three miles by portage to Saranac Lake.

18402 Decayed labradorite rock near south end of Tupper Lake, just before reaching river by which we go to Saranac Lake.

At several points along the river there are outcrops, but they are all of the hypersthene gabbro.

Monday August 8, 1898.
Saranac Lake.

Took a row over upper Saranac Lake. Adirondack was found but the hypersthene gabbro of the region.

18403 Ordinary phase of gabbro.

18404 Fine-grained phase. This and the coarse 18403, were found in contact. The relations seem to be the same as those that maintain between coarse and fine-grained granite, the coarser of which is so-called pegmatite.

18405 Granuliperous hypersthene gabbro. There is here no evidence of dynamic movement. The feldspars are not even finely striated.

Photo. 1066. View of Saranac Lake.

Photo. 1067. View of Wawbeek Farm.

Iron Mountain, Michigan,
Aug. 28, 1890.

The Ludington and Chapin mines were visited, in order to ascertain if possible if there are breaks between any members of the series. The assistant Superintendent of the Chapin said the ore and jasper occupied the same horizon; the ore lessens in quantity to the east and turns into jasper.
At the west also the lens pinches out and another begins in the jasper farther north.
The ore is bounded upon both sides by green slates which appear to be ordinary clay slates.
The succession from north to south, beginning south of the big hill south of the mine, is hydro-mica slate, lean ore and jasper, slate ore, slate and limestone; the dip is to the north at angles from 65 to 75 degrees,

so that the limestone here appears to be on top.
Between the limestone and the ore or slate is found at times a conglomerate like rock, which is said to contain fragments of limestone; this might be regarded as evidence that the limestone is older than the ore, but the conclusion is not clear, since in the limestone itself are chert breccias and conglomerate-like layers containing limestone and other pebbles; specimens of fragmental rocks, apparently bearing fragments of ore, were said to be found between the limestone and ore.
If this location by the captain and chemist is correct, it would seem that the limestone must be newer than the ore as appears from the Chapin quartzite.

18406 Quartzite.

18407 } Fragmental rock containing
18408 } particles of fragmental ore. f

Norway, Michigan,
August 29, 1890.

In the forenoon the Norway and Cyclops mines were visited; the unconformable relations between the Cambrian and the ore formation, long known to exist here, are at the present state of working beautifully exposed.

The contact between the Cambrian and the ore at the Cyclops is very irregular; the ore-body is here mostly worked out, but so far as mining is going on at present, the ore is the Cambrian basal conglomerate, or, if not that, the pre-Cambrian breccia or mantle formed by the breaking down by subaerial action of the pre-Cambrian rock. The sandstone is full of pebbles of ore, in certain layers quite a

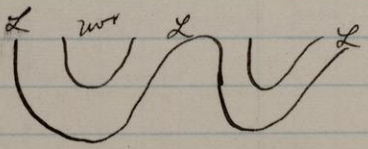
number of feet above its base.

18409 Sandstone at Cyclops showing fragments of ore.

The exposure of limestone back of the Norway pit was found to be a chert breccia,

18410.

The Captain and mine chemist state that the limestone is below the ore. The chemist says, that in the deeper workings of the mine the limestone is coming underneath the ore. A limestone appears again to the south of the Norway between the mine and the Aragon, and the chemist gave this as its structure.



The chemist also says that below the ore is a breccia which carries fragments of the limestone and
18411. gave 18411, breccia, as this rock. The chert fragments he called limestone.
This breccia appears to contain fragments of the ore.

18412 Breccia containing ore fragments of unmistakable character. At first this was said to be below the ore and limestone and later was said to occur with the ore formation.
While it appears clear that a rock occurs which carries ore fragments, no clear knowledge was to be had as to its relation to the ore body and the limestone.

18413 Slate north of the Vulcan mine; regularly banded,

dipping south at an angle of 60 or 70 degrees.

18414. Limestone breccia.

18415 Limestone. The two interstratified. The latter near the mine than the former. Both northeast of Vulcan mine.

18416. Green schist across valley about one half mile south of Vulcan.

While evidence was not found, as hoped, in determining whether there was any physical break of magnitude within the clastic series in the Menominee region, and also where the limestone belongs in the series, the fact that fragmental rocks are here found, which bear ore-fragments, seem to indi-

cate that we have an ore series in which the ore was in essentially its present condition before another part of that series was deposited. The conglomerate below the Cambrian, at the junction of the Cambrian with the ore series at the Cyclops, suggests the pre-Silurian subaerial mantle of Iron Mountain, Missouri. It is possible that farther to the east, where the Cambrian forms the whole or nearly the whole surface, that there may be found deposits of conglomeratic ore like that of Missouri.

Bayliss Goose Lake Camp. Mich.
Aug. 31/90.

We made a section from the granite on the south to the flag ores of Rominger on the north following the railroad, and in a boat skirted the shores of Goose Lake. The granite is a mixture of hornblende-schist or gneiss, apparently originated by injections of veins of granite along the schistosity, with also intrusions of numerous masses of granite of considerable sizes. After passing from the granite there followed a considerable thickness of chert, very much broken and massive; at times it becomes ferriferous and it is then jaspery or ferruginous; occasionally it is so ferruginous as to be test-pitted for ore. Above the chert, exposed for some distance south

of the south side of Goose Lake and along its east side for half its length, are alternations of calcareous chert which weathers in its characteristic manner. This material alternates with white layers, which are more calcareous, and with reddish layers which are fragmen-
1847. tal quartzite, 1847, (Specimen from south end of lake) and also other layers of various kinds. One of these,
1848, appears to be a chert in which is a good deal of clay material. In yet other places the
1849. limestone, 1849, is distinctly brecciated.

These alternations continue for the distance mentioned above, when appears
1850, a coarsely crystalline pink limestone which contains nodules of coarsely crystalline quartz. This field again

of considerable thickness, at
this becomes very quartzose
1842, and the rock is as much
a quartzite as a limestone.

Following the above is
quite a break in the exposures
1842. and then appears, 1842,
white vitreous quartzite.
This belt certainly extends
some distance in an east
and west direction, because
seen on the northeast side
of the lake and at the rail-
road. (4)

Now leaving the lake and
following the railroad, we
find green chloritic greywacke
slate, and after a short
interval — perhaps one half
a mile above the lake —
appears flaggy ores.
In all the above series, the
dip is plain and we are
passing to higher and
higher layers in the series.

Strike of woodcarving slate N.W. and S.E.; dip 70° (about) N.E.

Photo. 1139. Looking approximately north towards cherty limestone, which dips at a flat angle away from the observer. Near C&NW Ry track between Goose Lake & Gauthier's, Mich.

Photo 1140. View of Goose Lake from railroad track, looking N.E. at cliffs of chert and cherty limestone.

September 1st 1895.

From Conglomerate Station I ran a course for about three quarters of a mile in a direction between north and northwest. The succession observed was as follows; at the top of the hill is the dovelden
1842 3. conglomerate, 1842 3, which is a beautiful instance of a recomposed rock. This extends down into the valley going up the next hill the
1842 4. rock appears, a sericitic slate, which contains elongated fragments of quartz. This
1842 5. grades into 1842 5, a sericitic quartzite.
After an interval appears
1842 6. ferruginous quartzite, and next after this quartzite
1842 7. is found, 1842 7, chert and
1842 8. chert breccia. This chert breccia is largely exposed

and has apparently a considerable thickness.
After chert and chert breccia
1842.9. comes, 1842.9, a ferruginous slate. Here was the first opportunity to take strike and dip. This was done with a small compass; the strike is about northwest and southeast and the dip was estimated at 70° to the northeast. The next rock in the succes-
1843.0. sion is 1843.0, iron ore conglomerate which is in every respect like the Goodrich conglomerate.
North of the conglomerate
1843.1. appears 1843.1, ferruginous quartzite. The interval across the strike between 1842.9 and 1843.1 is not more than 5 feet.

30½

T. R.

Photos. 1141-42. Views of conglomerate at "Conglomerate" station (near center of Sec 22-47-26 W Mich). The large fragments are granitic.

Photo 1143. View of conglomerate at "Conglomerate" station (near center of Sec 22-47-26 W Mich

Upon the South side of the conglomerate station 8, immediately below the conglomerate, is ferruginous quartzite. The appearance of the section as observed is that of an overturned anticlinal, the conglomerate being the lowest layer and the ferruginous quartzite south and north of this conglomerate really the same layer.

I the above ore-conglomerate 1843 is the equivalent of the Goodrich conglomerate and that over the ore in all the mines, this conglomerate, the ferruginous quartzite the white quartzite at the railroad, and the flag ore, all belong to the newer iron bearing series, and the granite conglomerate, sericitic slate, and ferruginous slate to the lower series.

Marquette, Michigan,
September 2 1890.

We visited the old abandoned mine in the Eureka series about two miles west of Marquette. The ore was found to be merely seams of soft infiltrated hematite and limonite in the green schists. There is every where evidence in the schistose rocks of a great amount of slipping movement. Slickensides are not found at a single place, but everywhere between the lozenge shaped broken fragments of green schists. Along the seams caused by the movement the iron has entered. The "veins" are merely places where more iron has appeared, but even in the most ferruginous part, there is not

the slightest resemblance to the red and jasper of the iron-bearing series proper.

Marquette, Michigan.
September 8, 1890.

We made a study of the ferruginous layers which are found with the green schists and greenstones near Michigan street, two or three blocks west of Spruce street. The thickest mass where exposed on the street has in a remarkable degree the appearance of ferruginous cherts and jaspers of the ore series.

1824/32
1824/33 } Upon one side of it is green schist, 1824/84
1824/84. and upon the other is lustre-mottled rock,
1824/85. Also the iron bearing bed is separated into two parts by a layer of green schist. A brilliant fresh diabase outcrops a short distance to the south.